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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/759,639	01/16/2001	Masahiro Yoshida	OKI.206	2239

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EXAMINER

HO, TU-TU V

ART UNIT PAPER NUMBER

2818

DATE MAILED: 01/14/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/759,639

Applicant(s)

YOSHIDA ET AL.

Examiner

Tu-Tu Ho

Art Unit

2818

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 December 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) 18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14, 16 and 17 is/are rejected.
- 7) ☒ Claim(s) 15 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 January 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

Art Unit: 2818

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Election/ Restriction

2. Applicants' election of claims 1-17 is acknowledged. Accordingly, claim 18 is withdrawn from consideration.

Drawings

3. Figure 23 is described under "Description of the Related Art"; therefore should be designated by a legend such as – Prior Art – or – Background Art – in order to clarify what is applicants' invention. (See MPEP § 608.02(g)). Description for this figure should also be changed accordingly in "BRIEF DESCRIPTION OF THE DRAWINGS".

Correction is required.

4. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following informalities:

- Figure 1, Reference number 118a should be removed or changed to 108a; and
- Figure 10, add Reference numbers 412a and 414a (as described on line 7 page 12 of the specification);

Specification

5. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed. The examiner suggests that the title be changed to "Semiconductor Device Having a Thick Oxide Layer Under Gate Side Walls".

6. The disclosure is objected to because of the following typing errors:

- Page 14, lines 3 and 4, "os the inventor have shwon";
- Claim 5, line 3, "gate electrode and over a first portion";
- Claim 5 line 10, claim 14 line28, claim 16 line14, and claim 17 line29, "forming intermediate insulating layer" needs an article; and
- Claim 14, line 29, "wall structure" should have been "wall structure; and"

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1-3 are rejected under 35 U.S.C. 102(b) as being anticipated by Hikida et al. U.S. Patent 5,620,914.

Art Unit: 2818

Hikida et al. disclose in Figures 1(a) through 1(f), specifically 1(d), and respective portions of the specification a semiconductor device comprising:

- a semiconductor substrate;
- a silicon oxide layer 3 formed over a surface of said semiconductor substrate;
- a gate electrode 6 formed over a first portion of said silicon oxide layer; and
- a side-wall structure 10 formed over a second portion of said silicon oxide layer and adjacent said gate electrode, wherein a thickness of said second portion of said silicon oxide layer is greater than a thickness of said first portion of said silicon oxide layer (column 6, line 8, first portion is 10 nm, column 6, lines 51-53, second portion is 15 to 20 nm thick).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 4-14 and 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hikida et al.

Referring to claim 4, Hikida et al. disclose, as described above, a semiconductor device having all elements recited in claim 4, except that they never claimed the oxide layer 9 (figures 1(e) and 1(f) between side-wall structure 10 and the substrate as a diffusion deterrent layer.

Art Unit: 2818

However, this oxide layer and the claimed diffusion layer have the same characteristics, therefore, both would perform the same function, regardless how they are called.

Regarding claims 5-7 and 14, although not explicitly disclosed, Hikida et al.'s teaching could be applied for self-aligned contact process, a well-known process at the time the invention was made just as described in the specification of the present invention. One of ordinary skill in the art at the time the invention was made would have been motivated to use the teaching of Hikida et al. to prevent "jumping" of the edge of the gate electrode caused by oxidation processes after formation of the gate electrode for self aligned contact structures (column 2, lines 27-29). Regarding claim 14, on lines 34-53 of column 6, Hikida et al. disclose that oxide layer 8 is formed by oxidizing layer 7 for 20 minutes at 950 degree C and this 20-minute-long process causes the formation of a (first portion of the) side-wall structure and also the second portion 9 of the gate oxide layer, thus teaching that forming a (first portion of the) side-wall structure then expanding the thickness of the second portion 9. Regarding claim 5, referencing also figure 2, side-wall 10 is formed after second portion 9 has been expanded.

Referring to claims 11- 13, the proposed structure and method just described having thickness of the second portion 8 of the gate oxide layer (figures 1(d) and 1(e)) expanded using thermal oxidation (column 6, lines 34-36).

With respect to claims 8-10 and 16-17, the process disclosed is thermal oxidation, but one of skill in the art would recognize that the same end product could be achieved by a chemical vapor deposition process.

Allowable Subject Matter

Art Unit: 2818

11. Claim 15 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons for the indication of allowable subject matter: The cited art fails to teach or render obvious a method for manufacturing a semiconductor device having all elements recited in claims 14 and 15 characterized in that expanding the thickness of an oxide layer which is positioned between a gate side-wall structure and a substrate is performed **after** formation of an intermediate insulating layer which is formed over a cap layer, a gate electrode, and the gate side-wall structure.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- a) Reference B discloses a method for self aligned contact structures.
- b) Reference C discloses a semiconductor device having an oxide layer, which is between a gate side-wall structure and a substrate, having a thickness greater than the gate oxide layer. However, this oxide layer is **not a part** of the gate oxide layer.
- c) Reference D also discloses a semiconductor device having an oxide layer, which is between a gate side-wall structure and a substrate, having a thickness greater than the gate oxide layer. However, gate and gate side-walls and other structures are formed **after** this oxide layer.

Art Unit: 2818

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tu-Tu Ho whose telephone number is (703) 305-0086. The examiner can normally be reached on 6:30 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, DAVID NELMS can be reached on (703) 308-4910. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1782.

TTH

Tu-Tu Ho
January 7, 2002



David Nelms
Supervisory Patent Examiner
Technology Center 2800